



Joint Fires Systems Engineering – NSWC Dahlgren
20th Annual Test & Evaluation Conference &
Exhibition

**“First Steps Have The Biggest
Impacts”**

4 March 04

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The Focus

“In Acquisition, one can make a decision and not realize the real impact of that decision until two years later.” (Bo Heikes, 1999)

“Plans are nothing, Planning is everything.” (General Dwight D. Eisenhower)

Briefing Goals

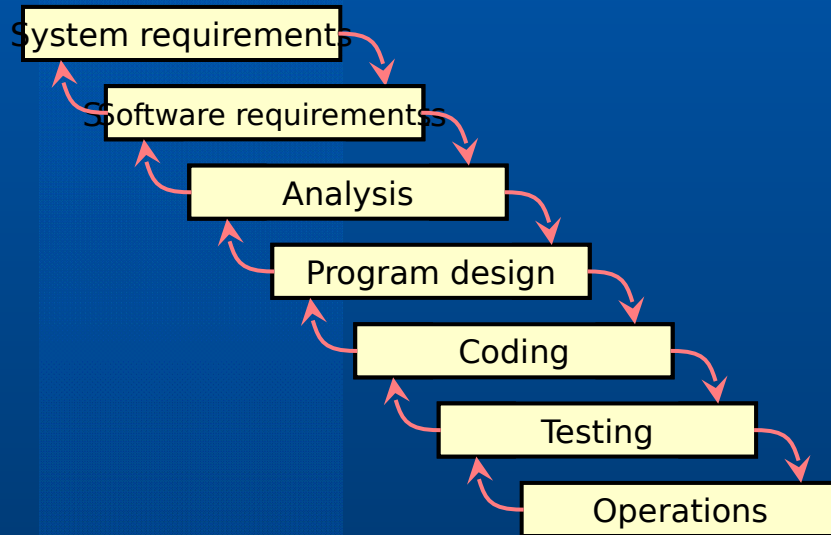
- To explain why the Test Community's early involvement resolves issues that arise when ready to test.
- To show how Spiral Development allows earlier testing to gain insight as to product development.
- To Prepare the information OT&E needs in a clear manner that will allow them to effectively audit your DT results.
 - Requirements Management.
 - Database collection of DT data and analysis.
- To learn the value of Scripting the tests events to ensure you are satisfying the test objectives.

Early Involvement

- **Program Managers (PM) should seek OT&E membership on Initial Capability Document (ICD) development:**
 - **Ensure Requirements are testable.**
 - (e.g. - Define “User Friendly”)
 - Get ICD clarification issues resolved early with MDA
 - **Ensure Requirements are Clear and Concise.**
 - (e.g. - Must operate with all Fleet Radios - Did you really intend the System to operate with 12 different radios?)
 - **Ensure Scope is properly identified early on in the program.**
- **OT&E member can guide the PM as to how the information can best be organized and presented for quicker OT&E analysis.**

Spiral Development - Earlier Testing

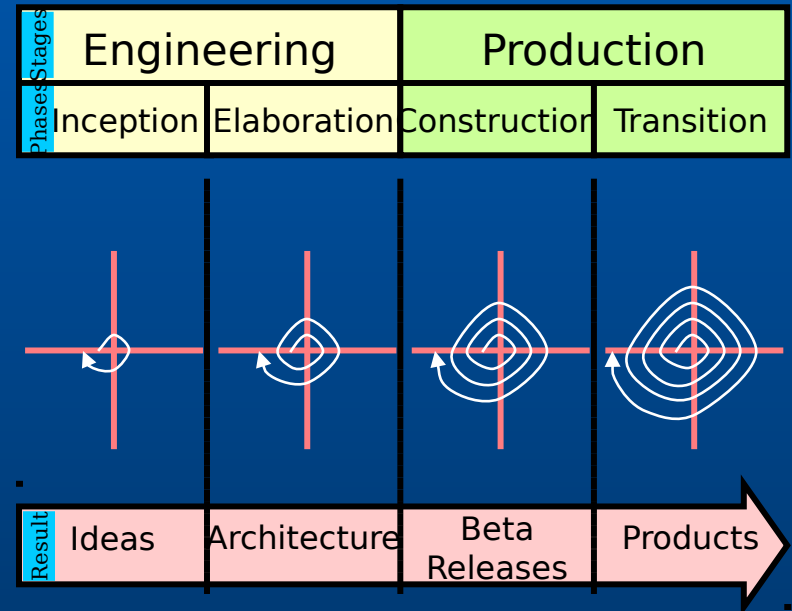
Waterfall



- Testing Accomplished Near the end of the program.
- 10x cost to affect changes discovered during testing.

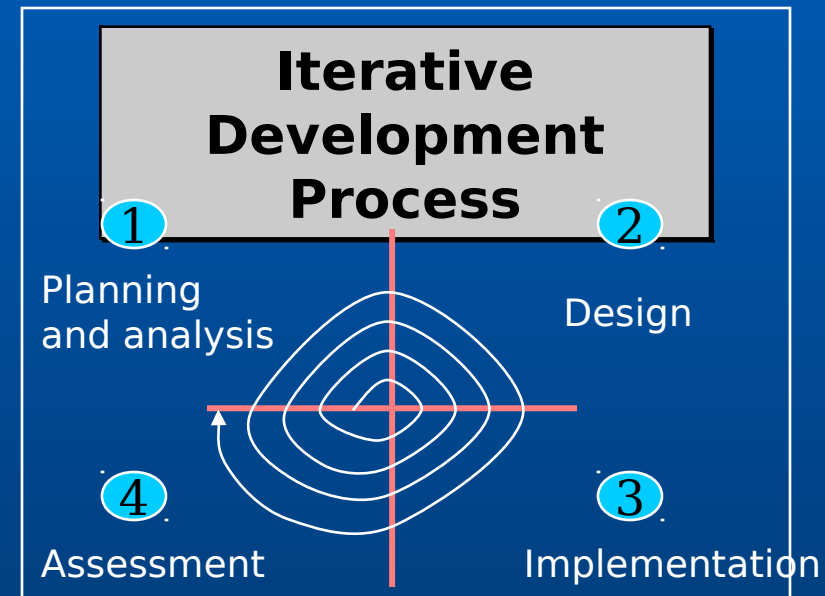
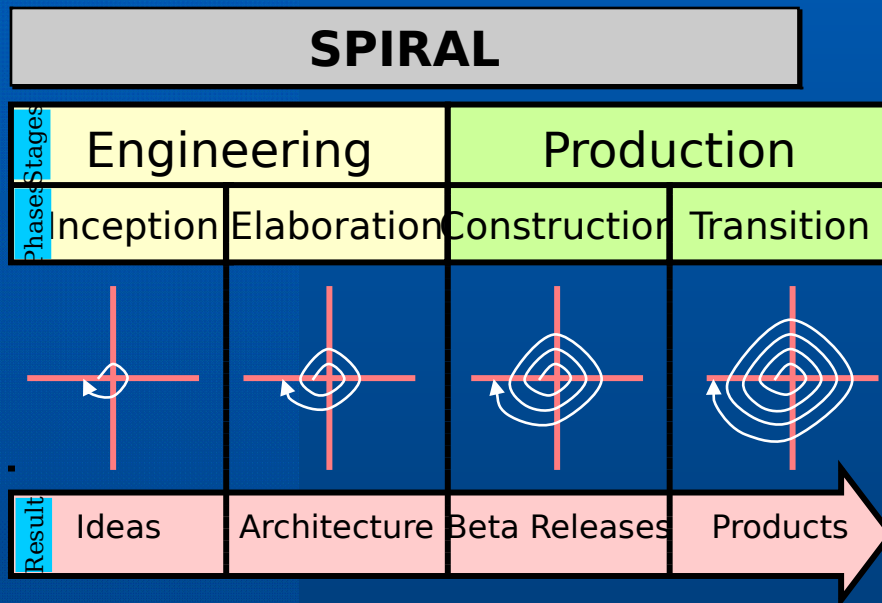
VS.

SPIRAL



- Testing begins in the Elaboration phase.
- Changes discovered during testing less costly to implement.

Spiral Development - Earlier Testing



- Each Phase of development goes through one or many iterative development processes.
- Testing - whether it be modeling and simulation or Developmental Testing can occur during these iterative developments.
- Discoveries can be rolled into the next iterative cycle.

Spiral Development - Earlier Testing

Block I

Task:

C4I System to
Digitally talk to:

Core C4I

F/A-18

AV-8B

F-16

Iterative Cycle **Test Events / INPUTS**

Planning
and analysis

Design

Implementation

Assessment



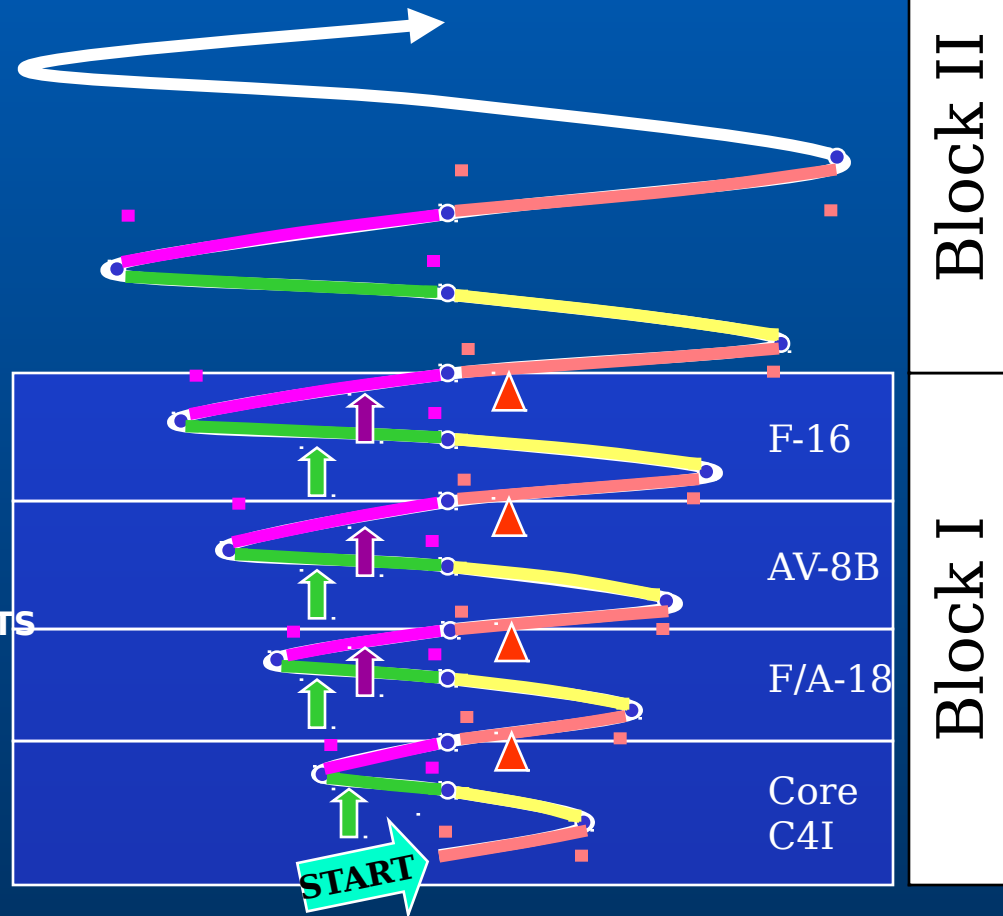
Contractor DT



Government DT

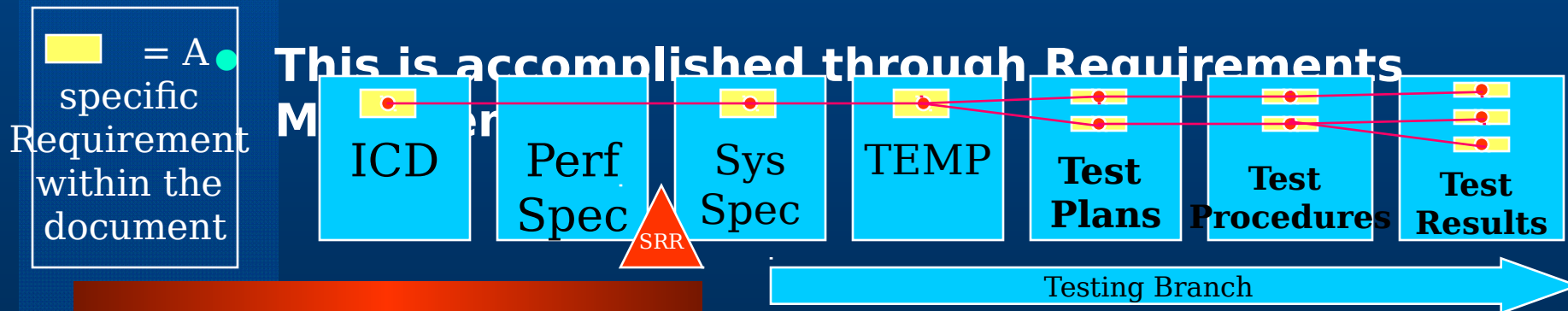


Improvements
Inserted
from early
testing
discovery



Planning For OT&E

- The Project System Engineer should plan to show to the OT&E community how the system has been validated and is ready for test (thread the needle):
 - TEMP
 - Test Plans which are Requirements Driven.
 - Test Procedures which clearly trace back to the Test Plan.



Collecting and Preparing Testing Data

- **The Test Team Lead needs to evaluate the type of data that needs to be collected and the format to best store that data.**
 - This should be accomplished before any testing begins.
 - Data that needs to be sorted or analysis should be inputted into a database.
- **Requirements Management tools should reflect the data records used for analysis to show how the requirement was validated.**

Scripting Data During Test Events

- **Test Events should be scripted during DT to ensure that all variables that need to be tested are tested and are they tested in the proper method.**
- **Scripting will also make it easier to answer the question of: How did we validate the requirement(s)?**

Test Result Reports

- **Test Result Reports should clearly tell the story of what was being tested, how it was tested, and the results of that testing:**
 - **The report should Identify whether the objective of a test run was satisfied.**
 - **It should call out the Higher-level requirement (ICD) and reflect which test runs were used in the analysis to satisfy or fail that requirement.**
 - **Should identify related areas to the test event which could not be tested. To assist with a follow-on test.**
 - **Should identify discrepancies with systems outside of the program in which the system has to Interoperate with.**

First Steps Have the Biggest Impact

- **Proper Planning up front will pay dividends later on in a program:**
 - **OT&E up-front involvement** - will alleviate untestable requirements when the program gets to DT and OT&E.
 - **Requirements Management** - provides traceability
 - Can occur parallel to other developing efforts of a program.
 - Allows OT&E to effectively audit the program.
 - **Test Plans** - should design and organize what you want to accomplish.
 - **Collection of Data** - knowing what you need to do with the data collected will identify the best format to collect it.
 - **The products produced (Test Result Reports)** should tell a clear story.
- **Think the task through before you even take the first step.**

Questions???

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